

August 7, 2016

To the Federal Communications Commission:

Re: Comments for Notice of Proposed Rulemaking RM-11708 in WT Docket No. 16-239

Thank you for allowing me to offer suggested changes and voice STRONG CONCERNS regarding this NPRM.

By background, I am a Registered Professional Engineer and an Amateur Extra Class license holder, first licensed in 1971. I have operated most all modes of amateur communication, including WINLINK and PACTOR, and am involved in Emergency Communications in an official leadership capacity in two Texas counties, as the RACES Radio Officer and ARES Emergency Coordinator for both nearby counties. My interests in amateur radio are very diverse and widespread, not those of a "special interest group" such as those that have pushed for RM-11708 as a way to provide free email and bypass commercial maritime services under the guise of "emergency communications" while exhibiting total disregard for incumbent spectrum users. The technical realities are that wideband emissions are incongruent with simultaneous narrowband emissions in the limited HF and MF allocations, thus requiring the Commission to impose bandwidth limitations in various HF/MF sub bands. This NPRM completely ignores the unintended technical consequences of interference that will result, despite the mandate that amateurs avoid interfering with others.

Also, I am a Life Member of the ARRL. In the spirit of full disclosure, I am a major financial contributor to the ARRL. Having said that, it brings me no pleasure to openly disagree with the ARRL, but based on the current situation and the very serious ramifications of this NPRM, I am left with no alternative but to openly do so. I simply could not disagree more with the ARRL with regard to their original RM-11708 rulemaking request. It was at best a very one sided approach that would allow "special interest" spectrum use at the expense of the traditional modes of CW and RTTY. RM-11708 ignores the concerns of many thousands of existing long time radio amateurs.

While emergency communications ability is important, we must not lose site of other important and longstanding legacy uses of the amateur service, namely the narrowband modes of CW and RTTY. If the current baud rate limit were removed, with no corresponding limits placed on bandwidth, the results will be catastrophic. How can the amateur service be self regulating and use the minimum bandwidth possible, yet have rules that allow unlimited bandwidth. Today's 300 baud limit serves as a governor or speed limit on the occupied bandwidth. Removing that limit and any bandwidth limitation makes the decision as to what bandwidth is needed for minimum interference an entirely subjective one. That is, one person's view may be to use more bandwidth than another. And with unlimited bandwidth, there is nothing to stop an operator from exceeding a sensible bandwidth and interfering with many operators in adjacent frequencies.

Furthermore, the FCC's implicit decision to make the bandwidth unlimited, while following the requirement to avoid causing interference, would only be useable in practice when no one else is in the band to interfere with! This clearly shows why there must be some bandwidth regulation, and why the narrowband users must be protected from the arbitrary wide bandwidth data signals.

If the baud rate is to be generally unlimited then, (taking into account the special situation for 30 and 60 meters which should remain "as is" with current mode limitations, 30 meters should remain CW, RTTY and 500 Hz digital, with which both bands work very well at this time), there must be a hard limit placed on bandwidth, and that a 200 Hz bandwidth be imposed on the very lowest 50 KHz band edges to preserve the integrity of narrowband experimentation and operation, and that the 500 Hz bandwidth should be the maximum bandwidth on all data signals within the lower 100 KHz portion of every HF and MF band, to ensure that future PACTOR and other wideband data experimented and WINLINK users do not overwhelm the very limited HF spectrum, where the vast majority of hams operate and experiment with CW and RTTY and narrower forms of highly spectrum-efficient data modulation. Many new such narrowband waveforms are now widely used by amateurs. Since first licensed, I have been a CW enthusiast and am an avid DXer. CW, RTTY and SSB are of course the mainstream modes for the DX hobby. While SSB spectrum is not affected by this NPRM, to eliminate the baud rate limit with no corresponding bandwidth limitation, literally throws traditional CW and RTTY spectrum under the bus, allowing signals of SSB bandwidth to freely encroach.

In originally reviewing the ramifications of RM-11708, we did a tremendous amount of research into many related subjects, such as how PACTOR 3 & 4 work technically, appropriateness of encryption or quasi encryption, how busy detectors work or don't work, maritime usage, what the wide band waveform of a modern transceiver looks like when operated on a deep cycle marine battery at 12V or less vs. a 13.8V power supply, common FCC 97.221 frequency excursions by existing automated stations operating at bandwidths greater than 500 Hz, better alternative maritime services for compliance with FCC 97.113, MARS radio email usage as mandated by DOD, waveform classifications and new modes beyond PACTOR, interference problems, past ARRL RMs and their history, public comments, potential for skimmer analysis during handshake of call signs and usage, lack of vertical vs. horizontal frequency deployment (coordinated sharing by servers of single frequencies), competitor analysis with regard to frequency desires, etc., etc. etc. The point is that a lot of material was reviewed in a very short time.

As part of this review, we quickly arrived at a truly complex question; what is amateur radio really all about? This is at the core of the issue. In our attempts to better frame that question in our own minds, we asked ourselves "what is amateur radio NOT really about?" That question is actually very interesting, as it gets at the usage of some of this new technology.

Amateur radio is not a "personal or private communications service" nor a "quasi commercial service", where folks use it primarily to avoid paying for maritime data plans, text message their non ham buddies, get WX maps for their commercial fishing vessel, post to Facebook, post blogs, etc. Winlink itself claims to be used by over 10,000 sailors. (http://www.dtreg.com/Winlink_Radio_Network.pdf) When FCC 97.113 is considered, surely there is a better suited service reasonably available to the maritime community as a routine email provider, other than amateur radio. Amateur radio is not meant to be a global ISP, nor a radio based backup for the internet. While that may be a prime directive for MARS, it is at best secondary for amateur radio, and certainly should not come at the expense of traditional usage.

Paradoxically, while ARRL objected strongly and rightfully to "Broadband Over Power Line" (BPL), their proposal of RM-11708 would in essence bring broadband directly into our non-phone frequencies, to compete directly with CW, RTTY and narrowband digital modes.

Amateur radio is not set up to be an encrypted service. As the FCC and ARRL have both said on numerous occasions in the past, we all need to know what is being said via amateur radio, and by whom. After all, that is a key to the self policing aspect of our great hobby. Besides that, when a real emergency does exist, we need a transparent way to ensure that all know what is going on, so that frequencies can be properly cleared and made available for responders.

Right now with the new PACTOR modes, it is virtually impossible for an Official Observer to actually perform their duties with regard to all the automated email servers that are in operation. A functional Official Observer program is essential to ensure the integrity and lawful use of amateur spectrum. May I suggest to anyone that might believe amateur radio has a need for encryption that they look to other radio services to provide for their "customers"; encryption is not consistent with the amateur radio service.

Presently, PACTOR 3 does not even have an option to force a CW ID. It uses a much more obscure FEC ID option. When an operator is unexpectedly interfered with by one of these automated stations, callsign capture by FEC is often not practical and in fact beyond the equipment capabilities of many amateurs. A simple CW ID levels the playing field and should be a requirement of these new modes! The "busy detectors" *sometimes* enabled by automated stations have been demonstrated repeatedly to be ineffective at best in detecting anything other than another PACTOR signal. Busy detectors alone simply will not solve the interference problem. The fact that PACTOR claims a distinct advantage over other narrowband modes is in and of itself very problematic from an interference standpoint.

The single biggest problem many of us see is interference from automated stations. Based on data obtained from Winlink.org, many of these automatic PACTOR stations are operating at greater than 500 Hz outside of the required "automatic station bands", with no apparent regard for FCC 97.221. If they don't have any regard now for

existing FCC rules, one really has to question their future regard for any voluntary band plan the ARRL might or might not develop.

Recently, during the costly "FT5ZM" Amsterdam Island DXpedition, one of these automated RMS Express stations was very active sending and receiving routine emails directly on the transmit frequency of FT5ZM in the 40M foreign phone band, while FT5ZM was working split SSB. Did the users check to see if the frequency was busy with SSB traffic? NO! They went right ahead with their email traffic and essentially jammed the DX station for well over an hour. With regard to Amsterdam Island and the digital interference that occurred, that interference cost many DXers a 40M SSB QSO. That DXpedition had an operational cost of \$20 per minute. As a financial contributor to FT5ZM, I am disappointed to see jamming of any sort, including the RMS Express situation cited above. We should really consider the appropriateness of email systems on HF, particularly broadband modes.

Nowhere does the original ARRL petition or the NPRM ever mention interference. An Unlimited bandwidth proposal, as in the NPRM, has interference ramifications within a small HF/MF spectrum allocation, just like an unlimited transmitter power proposal would.

To expect the amateur service to self regulate its use of bandwidth in an HF environment with global propagation is quite unreasonable. Experimentation of wide band signals should be used at UHF and above where vastly greater spectrum is available to amateurs and where global interference cannot occur due to the lack of ionospheric propagation.

An ARRL executive commented to me that we can't even imagine what technologies will be available in five to ten years. I certainly agree with and support that concept. The real question for us to ponder is this, what will those new technologies be used for? Will the usage of those new technologies really be "ham radio" or just some sort of personal radio service as described above? That is a core question to carefully keep in mind going forward, one that really gets at the heart and soul of the amateur radio service. As we all go forward with evolving technologies, it is my strong desire that we not lose sight of what amateur radio is all about.

In conclusion, it is my strong recommendation that the FCC please modify this NPRM to protect incumbent CW and RTTY users in the lower 100 KHz end of the HF and MF bands. Additionally, except as noted for 30 and 60 meters, a bandwidth limit of 200 Hz in the lower 50 KHz of each HF and MF band would further ensure protection of CW and novel highly spectrum efficient low bandwidth modulations, like JT-65 developed by noble laureate Dr. Taylor of Princeton. Such narrowband experimentation is critical for the state of the radio art, one of the crucial missions of the amateur radio service.

Furthermore, I believe the FCC should closely examine compliance with both FCC 97.221 and FCC 97.113 by automated and maritime email stations now in operation.

Let me finally add that I wholeheartedly endorse comments made by Dr. Theodore S. Rappaport, a world renowned Expert in Spectrum Utilization. Among many other world class accomplishments, he has authored most of the textbooks now in use on this subject and has testified before Congress as an Expert. Dr. Rappaport's comments are repeated below to emphasize their importance. It is my strongest recommendation that the FCC incorporate at a minimum his well reasoned comments into the NPRM.

Thank you,

Dan White

W5DNT

Dr. Rappaport's Input.....

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The notice of proposed rulemaking (NPRM) proposes to remove the baud rate and bandwidth of data signals in the HF bands, and seeks comments about if a bandwidth limit is required, as well as any economic consequences or benefits of its ruling (see Paragraphs 7, 8, footnote 28, footnote 37, Paragraph 10, and Paragraph 12). The FCC should recognize the important ramifications of this ruling, as it will impact the ability of the hundreds of thousands of narrowband operators to continue to enjoy the hobby if unlimited baud rate, unlimited bandwidth signals are allowed to operate in the same spectrum currently used by narrowband amateur operators. An unlimited bandwidth signal with unlimited baud rate will essentially allow wide walls of digital signals with arbitrarily large bandwidth to ride roughshod over narrowband signals. The FCC's NPRM was silent on the issue of interference, and should provide some governmental regulation to avoid the potentially disastrous situation where a regulatory framework would legally allow interference by unlimited bandwidth signal.

In its 1988 rulemaking, PR Docket 88-139, the FCC made a critical decision to separate transmission types so as to *relegate the transmission of certain inharmonious emission types to different segments of amateur service* (see NPRM at 2, footnote 8). Now, in 2016, the FCC should consider that a proposed unlimited baud rate and unlimited bandwidth signal is indeed a different and *in harmonious* type of emission than existing narrow band data transmissions used by hundreds of thousands of amateur operators. In the 28 years since rules were made for computer and data communication, we now live in a world with internet, wideband modems, and computer communications that are thousands of times faster than current regulations

ever considered. Yet, the HF spectrum available to amateur operators has remained extremely limited in bandwidth. Thus, while I support the removal of a baud rate limit and a bandwidth limit, *this must only be done* if narrowband transmissions are given protected HF spectrum in the lower edge of the HF bands, where none of the newly proposed signals would operate or leak into. The proposed wideband data emissions, such as Pactor 4 and other serial tone modems, are inharmonious to narrow band transmissions that are used by the overwhelming majority of amateur operators in the RTTY/data portion of the HF bands. A great deal of evidence for this was offered in the comments to RM-11708, see particularly the vast majority of public comments filed after March 17, 2014.

The overwhelming majority of users in the RTTY/Data bands (e.g. the lower 100 kHz of every HF band -- except for 60 meters) utilize narrowband transmissions such as CW, RTTY, PSK31, and JT65. These narrowband transmissions do not occupy more than ~200 Hz of RF bandwidth, and certainly never more than 500 Hz of bandwidth (where bandwidth may be defined and measured as being 50 dB down from peak continuous wave power, or some other suitable definition). These types of narrow band operations enjoy national and global popularity because of their narrow bandwidths, since such narrow band signals enable better signal to noise ratio and thus greater communication reliability for a given set of equipment. Narrow band signals are completely incompatible with simultaneous operation of wideband signals, and are rendered useless when interfered with by wide band signals. As noted in Footnote 37 by Leslie and others, and in Paragraph 9, the FCC has never allowed 2.8 kHz SSB signals in the RTTY /data segment of HF, because wideband SSB signals are much wider and drown out narrowband signals, rendering the narrowband signals useless. As it does with SSB/Voice/Image signals, the Commission should similarly protect narrowband RTTY and data signals from the newly proposed wide band data signals that would not be limited in bandwidth or baud rate. Without a rule that expressly protects the narrowband users in sub bands at the low end of the HF bands, there will be chaos and interference created to current CW, RTTY, and other narrowband operators, not just in the US, but globally due to the long distance nature of HF propagation.

The evidence in the RM-11708 record (see, for example comments filed by Gerdes, White, Morrison, Muns, the undersigned, and hundreds of others) shows the vitality of narrow band CW and RTTY modes even in the no-code licensing era, and documents how wideband interference levels caused by the NPRM would render CW and RTTY unusable in the case of interfering wideband stations. Further, hundreds of commenters provided strong evidence of the already existing large amounts of interference that was experienced by amateurs attributed to existing automated wider-band data stations or HF mailboxes that are grandfathered in and allowed to use wider bandwidths while failing to listen-before-transmitting. The Commission should also recognize that there was a large amount of seemingly automated "ballot stuffing" in the early days of the RM 11708 FCC posting (presumably by an organized group or groups wishing to gain access to the protected CW/Data HF sub bands, see an analysis of comments provided by the undersigned). This body of evidence that

pertains to interference, and the need for FCC regulation to protect narrow band operations, is part of the public record of RM-11708, and should be relied upon in the FCC deliberations for this NPRM. As noted above, the NPRM was completely silent on the interference problem, just as was the ARRL's original petition (the word "interference" or the consideration of interference by the proposed elimination of baud rate and bandwidth was never addressed by the FCC in its NPRM, but it must be considered, since the amateur radio service is limited in spectrum and relies on regulation to ensure inharmonious transmission types do not interfere with one another).

Without interference protection, the wideband unlimited data emissions being proposed will overwhelm and eliminate the ability of current narrow band operators to enjoy the Amateur Radio Service. In light of the interference issues, the FCC should reconsider its tentative assumption in Paragraph 10 that no bandwidth limitation is needed. In response to the Commission's request for comment on an appropriate bandwidth limit in Paragraph 12 of the NPRM, I would urge the commission to require all data /RTTY signals to have an emitted RF bandwidth (50 dB down from peak, or 50 dB down from a CW tone in the center of the emitted pass band, or some other definition) no greater than 500 Hz in the lowest 100 kHz of every applicable HF band (e.g. 1800-1900 kHz, 3500-3600 kHz, 7000-7100 kHz, 14000-14100 kHz, 21000-21100 kHz, and 28000-28100 kHz, as well as the WARC bands). This would ensure harmonious narrow band signaling (having no more than 500 Hz RF bandwidth) in a protected lowest portion of the HF bands, and would eliminate the inevitable wideband interference on a global scale that would result without such a protected narrow band sub band. By restricting bandwidths and ensuring wide band emissions do not drown out narrowband emissions in the lower edge of the HF bands, the new types of experimental data signals may thrive, while not hampering the vast majority of RTTY/data users who use narrowband transmissions.

Regarding the Commission's request for economic impact in Paragraph 8, I am certain that if promulgated, the NPRM in its current state will have a significant detrimental economic impact on hundreds of thousands of amateur operators in the US who currently operate CW and RTTY. The cost of allowing the proposed "wideband" or "unlimited baud rate" signals to operate throughout the existing lower portions of the HF bands, without a protected sub bands, would be enormous. Today, hundreds of thousands of amateur operators enjoy narrowband CW or RTTY (for example, the Straight Key Century Club is a group of tens of thousands of amateur radio morse code enthusiasts: <http://www.skccgroup.com/> --my SKCC number is 12,491). CWOps is another amateur radio club that fosters Morse code operation with membership numbers in the thousands if not tens of thousands <http://www.cwops.org/> . All of the amateur operators who are members of these clubs, and in similar RTTY clubs, have invested in Morse code equipment, electronic keyers, computer loggers, and narrow band filters in their equipment, and most enjoy the use of modest antennas that allow them to use the scarce HF spectrum for narrowband operation in the hobby for reliable communication. As was noted by hundreds of commenters in the RM-11708 proceeding (NPRM, footnote 1, particularly all comments filed after March 16, 2014),

CW is the most reliable, least expensive mode of communication in an emergency. Thus, CW and RTTY, and other narrowband modes, must be guaranteed a portion of the HF spectrum where they are protected from wideband data modes. Many commenters specifically noted that the population of Pactor 4 and WinLink operators is, in proportion, *thousands of times smaller in number* than today's narrow band operator population. To give up all the existing narrow band protection (which today is inherent in the 300 baud rate limit) would be a grave economic injustice and bring vast interference to amateurs who have invested in equipment for narrow band data and RTTY.

The commission should note that the US is the 2nd largest amateur population with Japan being the largest. In Japan, narrowband modes on HF are specifically protected in their governmental amateur rules – the operation of 200 Hz wide bandwidth CW and data is specifically protected at the lower portion of the HF bands (generally the lowest 20-50 kHz of the HF band), and an emission bandwidth limit of 500 Hz is generally required up to 100 kHz from the lowest HF band edge. IARU Region 1 has comparable recommendations to protect narrow band signaling from wider bandwidth signals. This is presumably why the FCC and Japanese regulators have never allowed SSB (2.8 kHz bandwidth) transmissions to operate where these narrow band CW (data) and RTTY signals are allowed to operate. In enacting this NPRM, the FCC must protect the narrowband operations by assuring the lowest 100 kHz of every HF band will not be permitted to emit more than 500 Hz bandwidth signals, and that the newly proposed wideband digital data signals, having unlimited bandwidth and baud rate, will not leak or emit into the narrowband sub band that must be created.

Thank you for considering these comments, and considering the impact of interference and existing investments made by the amateur radio community for use in the precious and small HF allocations – please revise the NPRM accordingly to protect narrowband CW/data and RTTY in the lower sub bands.

Theodore S. Rappaport, N9NB